UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/757,940	01/10/2001	R. Mark Halligan	77901	8523

24628 7590 04/08/2009

Husch Blackwell Sanders, LLP
Husch Blackwell Sanders LLP Welsh & Katz
120 S RIVERSIDE PLAZA
22ND FLOOR
CHICAGO, IL 60606

EXAMINER	
MOONEYHAM, JANICE A	
ART UNIT	PAPER NUMBER
3689	

MAIL DATE	DELIVERY MODE
04/08/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte R. MARK HALLIGAN and RICHARD WEYAND

Appeal 2008-2823
Application 09/757,940
Technology Center 3600

Decided: April 8, 2009

Before ALLEN R. MACDONALD, *Acting Vice Chief Administrative Patent Judge,* and LINDA E. HORNER and ANTON W. FETTING, *Administrative Patent Judges*.

HORNER, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

R. Mark Halligan and Richard Weyand (Appellants) seek our review under 35 U.S.C. § 134 of the Examiner's decision rejecting claims 96-101, 103-110, and 112-118. Claims 1-95 have been withdrawn from consideration and are not on appeal. Claims 102 and 111 have been canceled. We have jurisdiction under 35 U.S.C. § 6(b) (2002).

SUMMARY OF DECISION

We AFFIRM-IN-PART and ENTER NEW GROUNDS OF REJECTION PURSUANT TO OUR AUTHORITY UNDER 37 C.F.R. § 41.50(b).

THE INVENTION

The Appellants' claimed invention accounts for trade secret intellectual property assets (Spec. 1). Claims 96 and 114, reproduced below, are representative of the subject matter on appeal.

> 96. A programmed computer method based upon the six factors of a trade secret from the First Restatement of Torts for providing documentation, analysis, auditing, accounting, protection, and other management relating to an existence, ownership, access and employee notice of a plurality of trade secrets of an organization, said method implemented by the programmed computer to effect the following steps :

a) providing a questionnaire of six multiple-choice questions on an output device of the programmed computer that elicit responses through an input device of the programmed computer as to the extent that a trade secret meets each of the six factors of a trade secret from the First Restatement of Torts, said six factors including (1) the extent to which the information is known outside of the business; (2) the extent to which it is known by employees and others involved in the business; (3) the extent of measures taken by the business to-guard the secrecy of the information; (4) the value of the information to the business and to its competitors; (5) the amount of time, effort or money expended by the business in developing the information and (6) the ease or difficulty with which the information could be properly acquired or duplicated by others;

b) the programmed computer providing a numerical score value to each of the responses possible on the questionnaire;

c) the programmed computer accepting responses through the input device in response to the questionnaire with respect to a specific trade secret;

d) the programmed computer converting the individual responses received in c) to the respective numerical score values provided in b) ;

e) the programmed computer calculating the geometric mean, that is, the sixth root of the product, of the numerical score values of d) to create a single metric for the trade secret;

f) the programmed computer repeating steps c), d) and e) for each remaining trade secret of the plurality of trade secrets; and

g) the programmed computer ranking the plurality of trade secrets in ascending order or descending order of the calculated metric.

114. A programmed computer based upon the six factors of a trade secret from the First Restatement of Torts for providing documentation, analysis, auditing, accounting, protection, and other management relating to an existence, ownership, access and employee notice of a plurality of trade secrets of an organization, said computer comprising:

a) a questionnaire of six multiple-choice questions displayed on an output device of the programmed computer that elicit responses through an input device of the computer as to the extent that a trade secret meets each of the six factors of a trade secret from the First Restatement of Torts, said six factors including (1) the extent to which the information is known outside of the business; (2) the extent to which it is known by employees and others involved in the business; (3) the extent of measures taken by the business to guard the secrecy of the information; (4) the value of the information to the business and to its competitors; (5) the amount of effort or money expended by the business in developing the information and (6) the ease or difficulty with which the information could be properly acquired or duplicated by others;

b) the input device of the programmed computer that accepts the responses elicited by the questionnaire with respect to a specific trade secret;

c) a table of descriptive labels and definitions within the programmed computer that converts the elicited responses received from the input device to a respective numerical score value for each of the six factors;

d) an arithmetic processor within the programmed computer that calculates the geometric mean, that is, the sixth root of the product, of the numerical score values of c) to create a single metric for the trade secret and that repeats the process steps associated with elements b), c) and d) for each remaining trade secret of the plurality of trade secrets; and

e) a comparator processor within the programmed computer that ranks the plurality of trade secrets in ascending order or descending order of the calculated metric.

THE REJECTIONS

The Examiner relies upon the following as evidence of unpatentability:

Haber	US 5,136,646	Aug. 4, 1992
Spencer	US 6,356,909 B1	Mar. 12, 2002
Barney	US 6,556,992 B1	Apr. 29, 2003

The following rejections are before us for review: [1]

1. Claims 96-101, 103-110, and 112-118 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement.
2. Claims 96-101, 103-110, and 112-118 are rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter.
3. Claims 96, 103-105, 112-114, and 118 are rejected under 35 U.S.C. § 103(a) as unpatentable over Spencer and Barney.
4. Claims 97-101, 106-110, and 115-117 are rejected under 35 U.S.C. § 103(a) as unpatentable over Spencer, Barney, and Haber.

REJECTION OF CLAIMS 96-101, 103-110, AND 112-118 UNDER 35 U.S.C. § 112, FIRST PARAGRAPH FOR LACK OF ENABLEMENT

ISSUE

The Examiner determined that one skilled in the pertinent art could not make and use the invention of claims 96-101, 103-110, and 112-118 without undue experimentation because "[i]t is unclear from the disclosure how the computer would be programmed, without undue experimentation, to provide a numerical score value to each of the responses possible on the

[1] The Examiner withdrew a rejection of claims 96-101, 103-110, and 112-118 under 35 U.S.C. § 112, first paragraph, as not being supported by a specific asserted or well-established utility (Ans. 3).

questionnaire or to convert the responses received to the respective numerical score values in order to take into account all of the subjective answers which the process entails and further provides no guidance as to how to calculate the metric, much less what this calculated metric means." Ans. 15. In particular, the Examiner explains that "[i]t is the subjective nature of the appellant's [*sic.*] input into the computer and the lack of guidance and direction as to the meaning and application of values that raises the question of enablement." Ans. 16-17. The Examiner thus determined that for the Appellants' invention to be enabling to one skilled in the art, Appellants "would need to provide considerable direction and guidance as to how to interpret and analyze the six factors so that the result produced by this analysis would be predictable and repeatable." Ans. 20.

The Appellants contend that the desired output of the invention is "the aggregation of the user's judgment" with respect to six necessary component variables for a trade secret and that "[m]aking these subjective judgments on a 1 to 5 scale is well within the abilities of those skilled in the art of evaluating trade secrets" as is "understanding the numerical score value calculated with the geometric mean, which results in a value between 1 and 5." Reply Br. 14.

The issue before us is:

Have the Appellants shown the Examiner erred in determining that claims 96-101, 103-110, and 112-118 are unpatentable for lack of an

enabling disclosure because the results are based on subjective perceptions of the user and are thus non-repeatable and non-predictable?

PRINCIPLES OF LAW

The PTO bears the initial burden when rejecting claims for lack of enablement.

> When rejecting a claim under the enablement requirement of section 112, the PTO bears an initial burden of setting forth a reasonable explanation as to why it believes that the scope of protection provided by that claim is not adequately enabled by the description of the invention provided in the specification of the application; this includes, of course, providing sufficient reasons for doubting any assertions in the specification as to the scope of enablement. If the PTO meets this burden, the burden then shifts to the applicant to provide suitable proofs indicating that the specification is indeed enabling.

In re Wright, 999 F.2d 1557, 1561-62 (Fed. Cir. 1993) (citing *In re Marzocchi*, 439 F.2d 220, 223-24 (CCPA 1971)).

It is by now well-established law that the test for compliance with the enablement requirement in the first paragraph of 35 U.S.C. § 112 is whether the disclosure, as filed, is sufficiently complete to enable one of ordinary skill in the art to make and use the claimed invention without undue experimentation. *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988).

FINDINGS OF FACT

We find that the following enumerated findings are supported by at least a preponderance of the evidence. *Ethicon, Inc. v. Quigg*, 849 F.2d 1422, 1427 (Fed. Cir. 1988) (explaining the general evidentiary standard for proceedings before the Office).

1. There is adequate disclosure in Appellants' Specification to enable one having ordinary skill in the art to calculate a metric based on the inputted answers to multiple choice questions by simply assigning a numerical score value to each multiple choice response. Spec. 20-23 (Table C) and Spec. 20:14-17.
2. The predetermined threshold values of claims 104, 113, and 118 can be any number selected by the user, and the Specification need not provide any specific direction as to how to determine this threshold value in order to enable one skilled in the art to make and use the invention.
3. Even though the inputs may be based on the subjective characterization of a human being, the steps for calculating a metric based on the inputs and comparing or ranking based on the calculated metric are repeatable for any input provided.

ANALYSIS

The invention of independent claims 105 and 114 is a computer including hardware and software that is programmed to perform the recited

functions. The fact that the data input by the user on which the computer performs the recited functions is based on subjective characterization by the user does not render the claimed programmed computer not enabled. One having ordinary skill in the art could still program the computer to perform the recited functions in the manner claimed regardless of the numerical score values input by the user without undue experimentation (Facts 1-3).[2]

The invention of independent claim 96 is a programmed computer method having steps that correspond to the functional recitations in the "means" elements of claim 105. Thus, for the same reasons as provided for claim 105, the Appellants' Specification provides adequate disclosure for one having ordinary skill in the art to use the method of claim 105 without undue experimentation (Facts 1-3). Thus, we will not sustain the Examiner's rejection of claims 96-101, 103-110, and 112-118 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement.

---

[2] Although there is adequate description to enable one skilled in the art to make and use the invention, there is still inadequate disclosure of a specific algorithm (structure) for implementing the function of at least the last "means" element of claim 105 to pass muster under 35 U.S.C. § 112, sixth paragraph. *See Aristocrat*, 521 F.3d at 1336 ("Enablement of a device requires only the disclosure of sufficient information so that a person of ordinary skill in the art could make and use the device. A section 112 paragraph 6 disclosure, however, serves the very different purpose of limiting the scope of the claim to the particular structure disclosed, together with equivalents.")

NEW GROUND OF REJECTION OF CLAIMS 105-110, 112, AND 113 UNDER 35 U.S.C. § 112, SECOND PARAGRAPH

ISSUE

Does the Appellants' Specification provide adequate written description of the structure for performing the functions as recited in claims 105-113?

ADDITIONAL FINDINGS OF FACT

We find that the following enumerated findings are supported by at least a preponderance of the evidence. *Ethicon, Inc. v. Quigg*, 849 F.2d 1422, 1427 (Fed. Cir. 1988) (explaining the general evidentiary standard for proceedings before the Office).

4. Claim 105 uses "means for" language for each limitation recited in the body of the claim. App. Br., Claims Appendix.
5. Claim 105 does not recite structure sufficient to perform the function for each limitation of the claim in its entirety. App. Br., Claims Appendix.
6. The last element of claim 105 recites "means within the programmed computer for ranking the plurality of trade secrets in ascending order or descending order of the calculated metric."
7. The original Abstract of Appellants' Specification states only that analysis of the entered data includes "the ranking of trade secrets."

The Abstract does not provide an algorithm by which the ranking is implemented.

8. The Specification describes Figure 12 as "a block diagram of processors of the accounting digital computer of FIG. 1." Spec. 10:9-10. Figure 12 includes a block labeled "comparison processor." Spec. Fig. 12. The Specification does not provide any further description of the comparison processor of Figure 12.

9. Figure 1 shows a diagram of a general purpose computer. For example, the Specification discloses a digital computer used for data processing and a user interface device that displays data to the user and allows the user to enter data. Spec. 10-11; Fig. 1.

10. The Specification describes that this computer includes "[a]t least one means for storing the data entered into the system, as well as the programs required to implement the system, and the results of searches and calculations of the system that may be stored for later use or display, called a mass data storage device." Spec. 12:1-4. This is the only reference in the Specification to a program used to implement the system.

11. Thus, we understand the comparison processor of Figure 12 to be merely a processor found in any general purpose computer that is capable of performing a comparison between two values.

12. The Specification does not disclose any specific algorithm that the comparison processor would use to perform a comparison or ranking.

13. Pages 23-24 of the Specification describe comparing the metric with one or more threshold values to verify the existence of a trade secret and identifying outlying values where the metric is very high or very low. This identification of outlying values is described in the context of comparing the metric to the threshold value and does not refer to ranking of a trade secret. Thus, this portion of the Specification does not disclose ranking of trade secrets.

14. Even if the portion of the Specification discussed in Finding of Fact 13 were found to describe ranking of trade secrets generally, this description provides only a recitation of the function of ranking and does not disclose an algorithm for implementing the ranking function.

15. Thus, the Appellants' Specification describes only a general purpose computer and generally refers to a program on the computer that performs the function of ranking of trade secrets, but it does not describe an algorithm by which the function of ranking the trade secrets is implemented.

PRINCIPLES OF LAW

When a claim uses the term "means" to describe a limitation, a presumption inheres that the inventor used the term to invoke § 112, ¶ 6. *Altiris, Inc. v. Symantec Corp.*, 318 F.3d 1363, 1375 (Fed. Cir. 2003). "This presumption can be rebutted when the claim, in addition to the functional language, recites structure sufficient to perform the claimed function in its entirety." *Id.* Once a court concludes that a claim limitation is a means-plus-function limitation, two steps of claim construction remain: 1) the court must first identify the function of the limitation; and 2) the court must then look to the specification and identify the corresponding structure for that function. *Med. Instrumentation & Diagnostics Corp. v. Elekta AB*, 344 F.3d 1205, 1210 (Fed. Cir. 2003).

"If there is no structure in the specification corresponding to the means-plus-function limitation in the claims, the claim will be found invalid as indefinite." *Biomedino, LLC v. Waters Technologies Corp.*, 490 F.3d 946, 950 (Fed. Cir. 2007); *see also In re Donaldson*, 16 F.3d 1189, 1195 (Fed. Cir. 1994) (en banc).

In *Aristocrat Techs. Austl. Pty Ltd. v Inter. Game Tech.*, 521 F.3d 1328, 1333 (Fed. Cir. 2008), the court set forth that for a claim to a programmed computer, a particular algorithm may be the corresponding structure under § 112, sixth paragraph:

> For a patentee to claim a means for performing a particular function and then to disclose only a general purpose computer as the

structure designed to perform that function amounts to pure functional claiming. Because general purpose computers can be programmed to perform very different tasks in very different ways, simply disclosing a computer as the structure designated to perform a particular function does not limit the scope of the claim to "the corresponding structure, material, or acts" that perform the function, as required by section 112 paragraph 6.

That was the point made by this court in *WMS Gaming, Inc. v. International Game Technology*, 184 F.3d 1339 (Fed. Cir. 1999). In that case, the court criticized the district court, which had determined that the structure disclosed in the specification to perform the claimed function was "an algorithm executed by a computer." The district court erred, this court held, "by failing to limit the claim to the algorithm disclosed in the specification." *Id.* at 1348. The rationale for that decision is equally applicable here: a general purpose computer programmed to carry out a particular algorithm creates a "new machine" because a general purpose computer "in effect becomes a special purpose computer once it is programmed to perform particular functions pursuant to instructions from program software." *Id.*, *quoting In re Alappat*, 33 F.3d 1526, 1545 (Fed. Cir. 1994). The instructions of the software program in effect "create a special purpose machine for carrying out the particular algorithm." *WMS Gaming*, 184 F.3d at 1348. Thus, in a means-plus-function claim "in which the disclosed structure is a computer, or microprocessor,

> programmed to carry out an algorithm, the disclosed structure is not the general purpose computer, but rather the special purpose computer programmed to perform the disclosed algorithm." *Id*. at 1349.
>
> In a later case, this court made the same point, stating that a "computer-implemented means-plus-function term is limited to the corresponding structure disclosed in the specification and equivalents thereof, and the corresponding structure is the algorithm." *Harris Corp. v. Ericsson Inc.*, 417 F.3d 1241, 1253 (Fed. Cir. 2005). The court in that case characterized the rule of *WMS Gaming* as follows: "[T]he corresponding structure for a § 112 ¶ 6 claim for a computer-implemented function is the algorithm disclosed in the specification." 417 F.3d at 1249.

In *Aristocrat*, the only portion of the specification that described the structure corresponding to the three functions performed by the claimed "game control means" was a statement that it is within the capability of a worker in the art "to introduce the methodology on any standard microprocessor base [*sic*] gaming machine by means of appropriate programming." 521 F.3d at 1334. The court found that the reference to "appropriate programming" imposed no limitation whatever, as any general purpose computer must be programmed. *Id.* The court further found that the language of claim 1 referring to "the game control means being arranged to pay a prize when a predetermined combination of symbols is displayed in a predetermined arrangement of symbol positions selected by a player" simply describes the function to be performed and not the algorithm by

which it is performed. *Id.* The court further found that the language in claim 1 that recites "defining a set of predetermined arrangements for a current game comprising each possible combination of the symbol position selected by the player which have one and only one symbol position in each column of the display means" is merely a mathematical expression that describes the outcome of performing the function and not a means for achieving that outcome. *Id.* The court also found that the figures and tables in Aristocrat's patent, which provided examples of how player selections translate to possible winning combinations, and the corresponding portion of the written description, which contained mathematical descriptions of how many winning combinations would be produced, are simply examples of the results of the operation of an unspecified algorithm. *Id.* at 1335. Thus, the court held that Aristocrat failed to disclose the algorithms that transform the general purpose microprocessor to a special purpose computer programmed to perform the disclosed algorithm. *Id.*

In two other recent cases, the Federal Circuit followed *Aristocrat* in holding means-plus-function claims invalid for indefiniteness for lack of sufficient description of algorithms to transform a general purpose computer to a special purpose of computer under 35 U.S.C. § 112, sixth paragraph. *See Finisar Corp. v. DirecTV Group, Inc.*, 523 F.3d 1323, 1340-41 (Fed. Cir. 2008) and *Net Moneyin, Inc. v. Verisign, Inc.*, 545 F.3d 1359, 1367 (Fed. Cir. 2008).

ANALYSIS

Claim 105 uses "means for" language to describe each limitation in the body of the claim (Fact 4). As such, a presumption inheres that the Appellants used this "means for" language to invoke § 112, ¶ 6. These claim limitations do not recite structure sufficient to perform the claimed functions in their entireties (Fact 5). Thus, the presumption that § 112, ¶ 6 applies to the claim limitations is not rebutted.

Our rules require that for claims including "means for" language, the Appeal Brief contain:

> For each independent claim involved in the appeal and for each dependent claim argued separately under the provisions of paragraph (c)(1)(vii) of this section, every means plus function and step plus function as permitted by 35 U.S.C. § 112, sixth paragraph, must be identified and the structure, material, or acts described in the specification as corresponding to each claimed function must be set forth with reference to the specification by page and line number, and to the drawing, if any, by reference character.

37 C.F.R. § 41.37(c)(1)(v). Thus, we consult the Appellants' Summary of the Claimed Subject Matter in the Brief to assess whether sufficient structure is disclosed in the Specification for performing the function in the means-plus-function elements of claim 105.

Our analysis will focus on the last element of claim 105. The last element of claim 105 recites "means within the programmed computer for ranking the plurality of trade secrets in ascending order or descending order

of the calculated metric" (Fact 6). The function recited in this element is ranking the plurality of trade secrets in ascending order or descending order of the calculated metric.

The Appellants point to line 32 of the original Abstract, the comparison processor shown in FIG. 12, and the description on page 23, last paragraph through page 24, line 26. App. Br. 9-10.

The original Abstract states only that analysis of the entered data includes "the ranking of trade secrets." The Abstract does not provide an algorithm by which the ranking is implemented (Fact 7). The processor of Figure 12 is merely a processor found in any general purpose computer that is capable of performing a comparison between two values (Facts 8-11). The Specification does not disclose any specific algorithm that the comparison processor would use to perform a comparison or ranking (Fact 12). The description on pages 23-24 of the Specification does not disclose ranking of trade secrets as claimed, and even if it were found to describe ranking of trade secrets generally, this description provides only a recitation of the function of ranking and does not disclose an algorithm for implementing the ranking function (Facts 13-14).

Thus, the Appellants' Specification describes only a general purpose computer and generally refers to a program on the computer that performs the function of ranking of trade secrets, but it does not describe an algorithm by which the function of ranking the trade secrets is implemented (Fact 15). Accordingly, the Specification fails to disclose the algorithms that transform

the general purpose processor to a special purpose computer programmed to perform the disclosed function of the last element of claim 105.

The Appellant has failed to disclose any algorithm, and thus has failed to adequately describe sufficient structure, for performing the recited function of claim 105 so as to render the claim definite. Accordingly, claim 105 and claims 106-110, 112, and 113 depending therefrom are unpatentable under 35 U.S.C. § 112, second paragraph, as indefinite. *Aristocrat*, 521 F.3d at 1333.

REJECTION OF CLAIMS 96-101, 103-110 AND 112-118 UNDER 35 U.S.C. § 101

ISSUE

The Examiner determined that the invention of claims 96-101, 103-110, and 112-118 is not directed to patent-eligible subject matter under 35 U.S.C. § 101 because the claimed invention does not produce a useful, concrete, and tangible result. Ans. 4-6.

The Appellants contend despite the numerical scores of the claimed invention being based on subjective input of the user, the claimed invention nonetheless produces useful, concrete, and tangible results.

The issue before us is:

Have the Appellants shown the Examiner erred in determining that the subject matter of claims 96-101, 103-110, and 112-118 is not directed to patent-eligible subject matter under 35 U.S.C. § 101?

PRINCIPLES OF LAW

The law in the area of patent-eligible subject matter for process claims has recently been clarified by the Federal Circuit in *In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008) (en banc), *petition for cert. filed*, 77 USLW 3442 (U.S. Jan. 28, 2009) (No. 08-964).

The en banc court in *Bilski* held that "the machine-or-transformation test, properly applied, is the governing test for determining patent eligibility of a process under § 101." *Id.* at 956. The court in *Bilski* further held that "the 'useful, concrete and tangible result' inquiry is inadequate [to determine whether a claim is patent-eligible under § 101.]" *Id.* at 959-60.

The court explained the machine-or-transformation test as follows: "A claimed process is surely patent-eligible under § 101 if: (1) it is tied to a particular machine or apparatus, or (2) it transforms a particular article into a different state or thing." *Id.* at 954 (citations omitted). The court explained that "the use of a specific machine or transformation of an article must impose meaningful limits on the claim's scope to impart patent-eligibility" and "the involvement of the machine or transformation in the claimed process must not merely be insignificant extra-solution activity." *Id.* at 961-62 (citations omitted).

The court declined to decide under the machine implementation branch of the inquiry whether or when recitation of a computer suffices to tie a process claim to a particular machine. *Id.* at 962. As to the transformation branch of the inquiry, however, the court explained that transformation of a

particular article into a different state or thing "must be central to the purpose of the claimed process." *Id.* As to the meaning of "article," the court explained that chemical or physical transformation of physical objects or substances is patent-eligible under § 101. *Id.* The court also explained that transformation of data is sufficient to render a process patent-eligible if the data represents physical and tangible objects, i.e., transformation of such raw data into a particular visual depiction of a physical object on a display. *Id.* at 962-63. The court further noted that transformation of data is insufficient to render a process patent-eligible if the data does not specify any particular type or nature of data and does not specify how or where the data was obtained or what the data represented. *Id.* at 962 (citing *In re Abele*, 684 F.2d 902, 909 (CCPA 1982) (process claim of graphically displaying variances of data from average values is not patent-eligible) and *In re Meyer*, 688 F.2d 789, 792-93 (CCPA 1982) (process claim involving undefined "complex system" and indeterminate "factors" drawn from unspecified "testing" is not patent-eligible)).

ANALYSIS

The Appellants argue claims 96-101, 103-110, and 112-118 as a single group. App. Br. 18-26. Independent claim 96 is directed to a method, which is a different statutory class from the programmed computer of independent claims 105 and 114. As such, we address claim 96, and its

dependent claims 97-101, 103, and 104, as a group, and we address independent claims 105 and 114 and their dependent claims separately.

We apply the machine-or-transformation test, as described in *Bilski*, to determine whether the subject matter of process claim 96 is patent-eligible under 35 U.S.C. § 101.

Process claim 96 recites "a programmed computer method" in which each of the process steps is performed by the programmed computer. The issue presented by this claim is whether recitation of a programmed computer suffices to tie the process claims to a particular machine. This is the exact issue that the court in *Bilski* declined to decide. 545 F.3d at 962. The court did, however, provide some guidance when it explained that the use of a specific machine must impose meaningful limits on the claim's scope to impart patent-eligibility. *Id.* at 961-62. Claim 96 recites a method performed on a programmed computer. This recitation fails to impose any meaningful limits on the claim's scope as it adds nothing more than a general purpose computer that has been programmed in an unspecified manner to implement the functional steps recited in the claims. Were the recitation of a "programmed computer" in combination with purely functional recitations of method steps, where the functions are implemented using an unspecified algorithm, sufficient to transform otherwise unpatentable method steps into a patent eligible process, this would exalt form over substance and would allow pre-emption of the fundamental principle present in the non-machine implemented method by the addition of

the mere recitation of a "programmed computer." Such a field-of-use limitation is insufficient to render an otherwise ineligible process claim patent eligible. *Bilski*, 545 F.3d at 957 (citing *Diehr*, 450 U.S. at 191-92) (noting that eligibility under § 101 "cannot be circumvented by attempting to limit the use of the formula to a particular technological environment.").

The steps of process claim 96 also fail the second prong of the machine-or-transformation test because the data does not represent physical and tangible objects.[3] Rather, the data represents information about a trade secret, which is an intangible asset. Thus, the process of claim 96 fails the machine-or-transformation test and is not patent-eligible under 35 U.S.C. § 101. Dependent claims 97-101, 103, and 104 likewise fall with representative claim 96. 37 C.F.R. § 41.37(c)(1)(vii) (2008).

We vacate the rejection of claims 105-110, 112, and 113 under § 101. A rejection of a claim, which is so indefinite that "considerable speculation as to meaning of the terms employed and assumptions as to the scope of such claims" is needed, is likely imprudent. *See In re Steele*, 305 F.2d 859, 862(CCPA 1962) (holding that the examiner and the board were wrong in relying on what at best were speculative assumptions as to the meaning of the claims and basing a rejection under 35 U.S.C. § 103 thereon.) The issue before us here is whether claims 105-110, 112, and 113 seek to pre-empt the

[3] Because the data does not represent physical and tangible objects, we need not reach the issue of whether mere calculation of a number based on inputs of other numbers is a sufficient "transformation" of data to render a process patent-eligible under § 101.

use of a fundamental principle or only foreclose others from using a particular "application" of that fundamental principle. *See Diamond v. Diehr*, 450 U.S. at 187. We find it imprudent to speculate as to the scope of the "means" elements of these claims in order to reach a decision on this issue under § 101. It should be understood, however, that our decision to vacate the § 101 rejection is based on the indefiniteness of the claimed subject matter and does not reflect on the merits of the underlying rejection.

We need not reach the merits of the Examiner's rejection of claims 114-118 under 35 U.S.C. § 101, because, for the reasons provided *infra*, we affirm the Examiner's decision rejecting these claims as unpatentable under 35 U.S.C. § 103. *See In re Bilski*, 545 F.3d at 951 n.1 (noting that although 35 U.S.C. § 101 is a threshold requirement, if the PTO deems it appropriate, it may reject the claim on any other grounds without addressing § 101).

PRIOR ART REJECTIONS OF CLAIMS 105-110, 112, AND 113 UNDER 35 U.S.C. § 103

We also vacate the rejection of claims 105, 112, and 113 under 35 U.S.C. § 103(a) as being unpatentable over Spencer and Barney and the rejection of claims 106-110 under 35 U.S.C. § 103(a) as being unpatentable over Spencer, Barney, and Haber. We find it imprudent to speculate as to the scope of the "means" elements of independent claim 105, in order to reach a decision on these rejections. *In re Steele*, 305 F.2d at 862. We reiterate that it should be understood that our decision to vacate the § 103 rejections is based on the indefiniteness of the claimed subject matter and

does not reflect on the adequacy of the prior art relied upon or the merits of the underlying rejections.

PRIOR ART REJECTIONS OF CLAIMS 96-101, 103, 104, AND 114-118 UNDER 35 U.S.C. § 103

ISSUE

The Examiner found Spencer discloses the method of claim 96 and the programmed computer of claim 114, except that it does not disclose: that the subject matter of the invention is trade secrets; that the questions relate to the six factors for a trade secret of the First Restatement of Torts; calculating a geometric mean, the sixth root of the product of the numerical score values, to create a single metric; repeating the program for each of the remaining items to be evaluated; or ranking the items in ascending or descending order of the evaluated metric. Ans. 6-7. The Examiner found Barney discloses repeating the program for each of the remaining items to be evaluated and ranking the items, where the items are patents and other intangible intellectual property (IP) assets. Ans. 7. The Examiner concluded it would have been obvious to combine the ranking of IP assets, as taught by Barney, into the disclosure of Spencer so as to allow an entity to identify and study relevant characteristics of IP to determine and measure those metrics that are predictive of a possible future event, such as an intangible IP asset being litigated. Ans. 7. The Examiner further found neither Spencer nor Barney explicitly discloses rating trade secrets, or the

questions relating to the six factors, or calculating a single metric, such as by using a geometric mean of the numerical score values. Ans. 8. The Examiner found that a geometric mean is old and well known and concluded it would have been obvious to modify Spencer to include a geometric mean that is the sixth root of the product since the Appellants have identified six factors. Ans. 8. The Examiner also determined the fact that the subject matter is about trade secrets and that the questions relate to the First Restatement of Torts is non-functional descriptive material. Ans. 8.

The Appellants contend that Spencer forms his scorecards from a summing, or totaling, of weighted values assigned to questionnaire responses, and Barney uses a statistical regression analysis in generating his ranking criteria, and thus the combination of Barney and Spencer does not provide a basis for using a geometric mean for calculating a metric. App. Br. 27-28. The Appellants further contend that the Examiner erred in failing to give patentable weight to the claimed subject matter of trade secrets and the fact that the questionnaire relates to the six factors of a trade secret from the First Restatement of Torts. App. Br. 30-35.

The issues before us are:

Have the Appellants shown that the Examiner erred in determining that the step of calculating a geometric mean that is the sixth root of the product of the numerical score values would have been obvious to one having ordinary skill in the art at the time of the invention in view of the combined teachings of Spencer and Barney?

Have the Appellants shown that the Examiner erred in determining that the characterization of data in the claims as being related to trade secrets and the six factors from the First Restatement of Torts is non-functional descriptive material?

FINDINGS OF FACT

We find that the following enumerated findings are supported by at least a preponderance of the evidence. *Ethicon, Inc. v. Quigg*, 849 F.2d 1422, 1427 (Fed. Cir. 1988) (explaining the general evidentiary standard for proceedings before the Office).

16. The Examiner found that Spencer discloses a method including the steps of providing a questionnaire of multiple-choice questions and providing a numerical score value to each of the responses on the questionnaire, accepting responses to the questionnaire through the input device, and converting the responses received to a numerical score value. Ans. 7.
17. The Appellants do not contest the Examiner's findings as to the scope of Spencer as stated in Finding of Fact 16 above. App. Br., *passim*.
18. Spencer discloses that "the points for the weighted questions and sections are summed to produce the scorecard document that identifies the most qualified vendors." Spencer, col. 13, ll. 15-18.

19. Thus, Spencer discloses a step of calculating a single metric from multiple numerical scores values corresponding to user inputs, except that the numerical scores used to calculate the metric in Spencer are not six numerical scores that relate to the six factors of a trade secret from the First Restatement of Torts and the calculation does not involve calculating a geometric mean using the six scores.
20. The Examiner found that Barney discloses a method for scoring intangible intellectual property assets, repeating the method for each item to be evaluated, and ranking the items. Ans. 7.
21. The Appellants do not contest the Examiner's findings as to the scope of Barney as stated in Finding of Fact 20 above. App. Br., *passim.*
22. Barney discloses ranking intellectual property assets by identifying and comparing various relevant characteristics of individual assets in a database, assigning scores and relative weightings to the individual identified characteristics, and then repeatedly testing the scores and weightings against one or more known IP asset populations, and iteratively refining the scores and/or weightings to optimize the predictive accuracy of the algorithm. The results can be provided as raw scores representing the sum of an individual asset's weighted scores, which can be ranked. Barney, col. 12, l. 23 – col. 13, l. 8.

23. It is undisputed that neither Spencer nor Barney discloses calculating a geometric mean and neither patent explicitly discloses rating trade secrets using the six factors for a trade secret of the First Restatement of Torts. Ans. 8; App. Br. 27.

24. The Appellants' Specification discloses that at the time of the invention Section 757 of the First Restatement of Torts set forth the claimed six factors for evaluating the existence of a trade secret. Spec. 3:10-13.

25. The Appellants have not contested the Examiner's finding that geometric mean is understood in the art to mean the nth root of the product of n numbers. Ans. 46 (citing Merriam Webster on line dictionary); App. Br. 29.

26. It was known in the art of statistics at the time of the invention that averages may be computed from a series of quantitative observations of various kinds about a subject or group of subjects. Dr. Franz Zizek, *Statistical Averages, A Methodological Study* 8 (1913).[4] The average computed from the series represents the mean of the measurement in question or indicates when a definite quantitative character is obtained by counting, how many units of that character occur on the average. *Id.* at 9.

[4] A copy of excerpts from Zizek relied upon in this Opinion are attached hereto in an Appendix.

27. It was preferable in the art to use the geometric mean to calculate commodity index numbers because it is less influenced by violent price fluctuations of single commodities than is the arithmetic mean. *Id.* at 197.

28. At the time of Appellants' invention, there were a finite number of generally accepted methods for calculating an average of a plurality of numbers, including: median, mode, arithmetic mean, and geometric mean. *Id.* at vi-vii (Table of Contents).

29. The data elements used in the claimed method do not functionally change the implemented method in that they do not alter how the process steps are to be performed to achieve the utility of the invention.

30. Rather, these data elements represent merely underlying data in a database.

31. Haber discloses using a hashing function to create a representative "fingerprint" of a document's original content to provide an assurance that a document cannot be secretly revised after application of a time stamp to the document (Haber, col. 3, ll. 50-55).

PRINCIPLES OF LAW

"Section 103 forbids issuance of a patent when 'the differences between the subject matter sought to be patented and the prior art are such

that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.'" *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1734 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) where in evidence, so-called secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). *See also KSR*, 127 S. Ct. at 1734 ("While the sequence of these questions might be reordered in any particular case, the [*Graham*] factors continue to define the inquiry that controls.")

ANALYSIS

The Appellants argue claims 96, 103, 104, 114, and 118 as a group. App. Br. 26-35. As such, we select claim 96 as representative of the group, and the remaining claims 103, 104, 114, and 118 stand or fall with claim 96. 37 C.F.R. § 41.37(c)(1)(vii) (2008).

The Appellants do not contest the Examiner's findings as to the scope and content of Spencer and Barney or as to the differences between Spencer and Barney and the claimed method (Facts 16, 17, 20, 21, 23). Rather, the Appellants challenge the Examiner's conclusion that it would have been obvious to one having ordinary skill in the art to modify the method of Spencer, as modified by Barney, by using the old and well-known geometric

mean calculation. App. Br. 28-29. In particular, the Appellants argue that the prior art contains no suggestion of applicability of the geometric mean to intellectual property and further argue that:

> In fact, the geometric mean is typically used, and considered particularly appropriate, for the averaging of multiple measurements of a single physical quantity, such as the flow of liquid in a tube or blood flow in a blood vessel, to come up with an accurate value. Its use for creating a ranking criteria for trade secrets from multiple different evaluation parameters is in fact counterintuitive based on this prior art.

App. Br. 29. Claim 96 defines the geometric mean as "the sixth root of the product, of the numerical score values," where the values were assigned based on responses to six multiple choice questions about the six factors of a trade secret. As noted by the Examiner, and undisputed by Appellants, the geometric mean calculation was generally well-known at the time of Appellants' invention and was defined as "the nth root of the product of n numbers" (Fact 25).

Spencer discloses that "the points for the weighted questions and sections are summed to produce the scorecard document that identifies the most qualified vendors." (Fact 18). Barney discloses ranking intellectual property assets by identifying and comparing various relevant characteristics of individual assets in a database, assigning scores and relative weightings to the individual identified characteristics, and then repeatedly testing the scores and weightings against one or more known IP asset populations, and

iteratively refining the scores and/or weightings to optimize the predictive accuracy of the algorithm. The results can be provided as raw scores representing the sum of an individual asset's weighted scores, which can be ranked (Fact 22). Thus, in both Barney and Spencer, the ranking occurs after a simple summing of scores.

As noted by the Appellants, the First Restatement of Torts identifies six factors or characteristics of a trade secret (Fact 24). Thus, if one were to rank trade secrets according to the teachings of Barney, which suggests that its method can be used for any intellectual property asset (Fact 22), of which trade secrets are such an asset, then one would assign a score and/or weighting to each of the six accepted characteristics of a trade secret and then sum these six scores to obtain a raw score that can be used for ranking the trade secret.

The question that remains is whether it would have been obvious to one having ordinary skill in the art at the time of Appellants' invention to use the well-known geometric mean calculation, in lieu of a simple summing of scores, in the method of Spencer, as modified by Barney, to calculate a metric used to rank intellectual property assets.

It was known in the art of statistics at the time of the invention to compute averages from a series of quantitative observations of various kinds about a subject or group of subjects for purposes of comparison (Fact 26). Although we have no specific evidence before us that it was known in the art to use geometric mean specifically to average ratings of trade secrets in

order to rank them as compared to other trade secrets, we do know that it was known in the art to use averages, and in particular geometric mean, to calculate commodity index numbers (Fact 27). We further know that it was preferable in the art to use the geometric mean to calculate commodity index numbers because it is less influenced by violent price fluctuations of single commodities than is the arithmetic mean (Fact 27). Further, it is our understanding that at the time of Appellants' invention, there were a finite number of generally accepted methods for calculating an average of a plurality of numbers, including: median, mode, arithmetic mean, and geometric mean (Fact 28).

Thus, we conclude that it would have been obvious, in view of the teachings of Spencer and Barney, to use geometric mean as a way to average scores relating to a trade secret, so that the trade secret could be ranked as compared to other trade secrets. In particular, the geometric mean had advantages over other methods of calculating averages, such as being less affected by severe fluctuations in the score of a particular factor. Further, it would have been obvious to try using geometric mean as a method of calculating an average metric, because geometric mean was a known option for calculating averages from among a finite number of methods well within the technical grasp of a person of ordinary skill in the art, and thus its use in this context is likely not the product of innovation but of ordinary skill and common sense. *KSR*, 550 U.S. at ___, 127 S. Ct. at 1742.

The Appellants further argue that the method of claim 96 is patentable over Spencer and Barney because neither teaches using a questionnaire that relates to the six factors of a trade secret from the First Restatement of Torts. App. Br 29-30. The Examiner determined that the subject matter of the questions in the questionnaire is non-functional descriptive material that cannot be relied upon to establish patentability over the art. Ans. 8-9.

The issue thus turns on whether the Examiner properly determined that the data being processed in the claimed method is non-functional descriptive material. We agree with the Examiner's determination.

Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." Exemplary "functional descriptive material" consists of data structures and computer programs, which impart functionality when employed as a computer component. "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.

When functional descriptive material is recorded on some computer-readable medium, it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. *Compare In re Lowry*, 32 F.3d 1579, 1583-84 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) with *In re Warmerdam*, 33 F.3d 1354, 1361-62 (Fed. Cir. 1994) (claim to computer having a specific data structure stored in memory held

statutory product-by-process claim but claim to a data structure that referred to ideas reflected in nonstatutory process rather than referring to a physical arrangement of the contents of a memory held nonstatutory).

When presented with a claim including nonfunctional descriptive material, an Examiner must determine whether such material should be given patentable weight. The Patent and Trademark Office (PTO) must consider all claim limitations when determining patentability of an invention over the prior art. *In re Gulack*, 703 F.2d 1381, 1385 (Fed. Cir. 1983). The PTO may not disregard claim limitations comprised of printed matter. *See Gulack*, 703 F.2d at 1384; *see also Diamond v. Diehr*, 450 U.S. at 191. However, the PTO need not give patentable weight to descriptive material absent a new and unobvious functional relationship between the descriptive material and the substrate. *See Gulack*, 703 F.2d at 1386. *See also In re Ngai*, 367 F.3d 1336, 1338 (Fed. Cir. 2004); *In re Lowry*, 32 F.3d 1579, 1583-84 (Fed. Cir. 1994). The burden of establishing the absence of a novel, nonobvious functional relationship rests with the PTO. *In re Lowry*, 32 F.3d at 1584.

We conclude that when the prior art describes all of the claimed structural and functional relationships between descriptive material and the substrate, but the prior art describes a different descriptive material than the claim, then the claimed descriptive material is non-functional and will not constitute a sufficient difference from the prior art to establish patentability.

That is, we conclude that such a scenario presents no new and unobvious functional relationship between the descriptive material and the substrate.

We find that the data elements used in the claimed method do not functionally change the implemented method in that they do not alter how the process steps are to be performed to achieve the utility of the invention (Fact 29). Rather, these data elements are analogous to printed matter in that they represent merely underlying data in a database (Fact 30). *See In re Lowry,* 32 F.3d 1579, 1583 (Fed. Cir. 1994). The prior art suggests using the method steps of providing a questionnaire, accepting multiple inputs, providing a corresponding numerical score to each input, calculating a single metric based on the numerical scores, and ranking based on the calculated metrics (Facts 16, 20). The present invention uses these same method steps to calculate a metric for a trade secret. The difference between the prior art and the claimed invention is simply the underlying meaning of the accepted inputs as relating to a trade secret instead of vendor qualifications. These inputs neither enhance nor diminish the functionality of the steps used to calculate the metric and rank it.

This case is distinguished from *Lowry*, because in *Lowry* the claims were directed to data structures stored in memory that contained both information used by application programs and information regarding their physical interrelationships within a memory. *Id.* As such, the court found that the claimed data structures of Lowry's invention were not analogous to printed matter because they managed information by imposing a physical

organization on the data and provided increased computing efficiency. *Id.* By contrast, the present invention is directed to a method where the only distinction to the prior art is the content of the data elements. Unlike in *Lowry*, the data in the present case does not impose any functional requirements on the claimed method or otherwise depend functionally on the information content of the data elements. Nonfunctional descriptive material cannot render nonobvious an invention that would have otherwise been obvious. *In re Ngai*, 367 F.3d 1336, 1339 (Fed. Cir. 2004). *Cf. In re Gulack*, 703 F.2d 1381, 1385 (Fed. Cir. 1983) (when descriptive material is not functionally related to the substrate, the descriptive material will not distinguish the invention form the prior art in terms of patentability). *See also Ex parte Mathias*, No. 2005-1851 (BPAI Aug. 19, 2005), *aff'd. In re Mathias*, No. 2006-1103, 2006 WL 2433879 (Fed. Cir. Aug. 17, 2006) (Rule 36, unpublished) and *Ex parte Curry*, No. 2005-0509 (BPAI Jun. 30, 2005), *aff'd. In re Curry*, No. 2006-1003 (Fed. Cir. Jun. 12, 2006) (Rule 36, unpublished) (both cases treating data as nonfunctional descriptive material).

The Appellants assert that this case is analogous to the facts presented in *In re Miller*, 418 F.2d 1392 (CCPA 1969), because "the presentation of the questionnaire based on the six factors of a trade secret to the user is thus functionally interrelated to the useful act of creating a listing of trade secrets in the ranked order in which they can be expected to pass legal muster, at least in the aggregated judgment of the user." App. Br. 31.

The claims at issue in *Miller* related to a measuring receptacle such as a spoon or cup bearing quantity measuring indicia of a selected ratio or proportion to, but different from, the actual quantity measured in the receptacle by the indicia to allow the user to easily measure a fractional quantity of an amount called for in a recipe. 418 F.2d at 1394. The claims also recited that the measuring receptacle included a legend for specifying the ratio or proportion of a full recipe which the indicia actually measure. *Id.* The court in *Miller* held that there was a "new and unobvious functional relationship between a measuring receptacle, volumetric indicia thereon indicating volume in a certain ratio to actual volume, and a legend indicating the ratio." *Id.* at 1396.

Considering the Appellants' argument that the claims require presentation of a questionnaire that is based on six factors of a trade secret, and accepting inputs in response to questionnaire which are used in later method steps to calculate a metric and rank the trade secret, we find that this relationship is not a functional relationship between the input data and the operation of the method steps. All that the claim requires is acceptance of "six inputs" that are then converted to numerical score values, used to calculate a metric, and ranked. The only part of the claimed method that arguably ties the method to a trade secret is the fact that the first step specifically requires that the questionnaire questions relate to the six factors of a trade secret. We do not find the subject matter of the questions to be a patentable distinction since the prior art discloses providing a questionnaire

that requires the input of answers to multiple questions. The remaining method steps are unchanged regardless of whether the input relates to a trade secret or something entirely different. Thus, the data elements used in the claimed method do not functionally change the implemented method in that they do not alter how the process steps are to be performed to achieve the utility of the invention. As such, the Appellants have failed to demonstrate error in the Examiner's determination of obviousness of claim 96. Claims 103, 104, 114, and 118 fall with claim 96.

With regard to the rejection of claims 97-101, 106-110, and 115-117 under 35 U.S.C. § 103(a) as unpatentable over Spencer, Barney, and Haber, the Appellants argue that none of the cited references teach or suggest the use of a certificate for protecting trade secrets. App. Br. 36. For the reasons discussed above with regard to the subject matter of trade secrets being insufficient to patentably distinguish the invention, we find this argument unpersuasive.

The Appellants further argue that none of the cited references or combination teach or suggest the use of an application fingerprint. App. Br. 36. The Examiner found, however, that Haber discloses creating an application fingerprint of data. Ans. 10 (citing Haber, col. 3, ll. 50-55). In particular, the portion of Haber relied on by the Examiner discloses using a hashing function to create a representative "fingerprint" of a document's original content to provide an assurance that a document cannot be secretly revised after application of a time stamp to the document (Fact 31). Aside

from the Appellants' bald assertion that Haber does not disclose an application fingerprint, the Appellants have failed to provide any specific reasons why the Examiner erred in the finding that Haber discloses the claimed application fingerprint. Appellants have the burden on appeal to the Board to demonstrate error in the Examiner's position. *See In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection [under § 103] by showing insufficient evidence of prima facie obviousness or by rebutting the prima facie case with evidence of secondary indicia of nonobviousness.") (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)). The Appellants have failed to persuade us of error in the Examiner's determination of obviousness of claims 96-101, 103, 104, and 114-118.

Because our conclusions of obviousness relied, in part, on an additional reference to demonstrate what was known in the art at the time of the invention relating to geometric mean, we designate our affirmance of the rejections of claims 96-101, 103, 104, and 114-118 under 35 U.S.C. § 103 as new grounds of rejection to include in addition to the references relied upon by the Examiner, the reference to Zizek.

CONCLUSIONS OF LAW

The Appellants have shown that the Examiner erred in rejecting claims 96-101, 103-110, and 112-118 under 35 U.S.C. § 112, first paragraph, as failing to provide an enabling disclosure. We enter a new

ground of rejection of claims 105-110, 112, and 113 under 35 U.S.C. § 112, second paragraph, as being indefinite. Due to this new ground of rejection, we vacate the Examiner's rejections of: claims 105-110, 112, and 113 under 35 U.S.C. § 101 as being directed to patent ineligible subject matter; claims 105, 112, and 113 under 35 U.S.C. § 103(a) as being unpatentable over Spencer and Barney; and claims 106-110 under 35 U.S.C. § 103(a) as being unpatentable over Spencer, Barney, and Haber.

The Appellants have failed to show that the Examiner erred in rejecting claims 96-101, 103 and 104 under 35 U.S.C. § 101 as being directed to non-statutory subject matter; claims 96, 103, 104, 114, and 118 under 35 U.S.C. § 103(a) as unpatentable over Spencer and Barney; and claims 97-101 and 115-117 under 35 U.S.C. § 103(a) as unpatentable over Spencer, Barney, and Haber.

We do not reach the issue of whether the Examiner erred in rejecting claims 114-118 under 35 U.S.C. § 101.

DECISION

The decision of the Examiner is REVERSED as to the rejection of:

- Claims 96-101, 103-110, and 112-118 under 35 U.S.C. § 112, first paragraph, as failing to provide an enabling disclosure.

The decision of the Examiner is AFFIRMED as to the rejection of:

- Claims 96-101, 103 and 104 under 35 U.S.C. § 101 as being directed to non-statutory subject matter.

The decision of the Examiner is VACATED as to the rejections of:

- Claims 105-110, 112, and 113 under 35 U.S.C. § 101 as being directed to patent ineligible subject matter;
- Claims 105, 112, and 113 under 35 U.S.C. § 103(a) as being unpatentable over Spencer and Barney; and
- Claims 106-110 under 35 U.S.C. § 103(a) as being unpatentable over Spencer, Barney, and Haber.

We enter NEW GROUNDS OF REJECTION of:

- Claims 105-110, 112, and 113 under 35 U.S.C. § 112, second paragraph as being indefinite;
- Claims 96, 103, 104, 114, and 118 under 35 U.S.C. § 103(a) as unpatentable over Spencer, Barney, and Zizek; and
- Claims 97-101 and 115-117 under 35 U.S.C. § 103(a) as unpatentable over Spencer, Barney, Zizek, and Haber.

FINALITY OF DECISION

Regarding the affirmed rejection(s), 37 C.F.R. § 41.52(a)(1) provides "Appellant may file a single request for rehearing within two months from the date of the original decision of the Board."

In addition to affirming the Examiner's rejections of one or more claims, this decision contains new grounds of rejection pursuant to 37 C.F.R. § 41.50(b) (2007). 37 C.F.R. § 41.50(b) provides "[a] new ground of rejection pursuant to this paragraph shall not be considered final for judicial review."

37 C.F.R. § 41.50(b) also provides that Appellant(s), WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new grounds of rejection to avoid termination of the appeal as to the rejected claims:

> (1) *Reopen prosecution.* Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the Examiner, in which event the proceeding will be remanded to the Examiner. . . .
>
> (2) *Request rehearing.* Request that the proceeding be reheard under § 41.52 by the Board upon the same record. . . .

Should Appellants elect to prosecute further before the Examiner pursuant to 37 C.F.R. § 41.50(b)(1), in order to preserve the right to seek review under 35 U.S.C. §§ 141 or 145 with respect to the affirmed rejection, the effective date of the affirmance is deferred until conclusion of the

prosecution before the Examiner unless, as a mere incident to the limited prosecution, the affirmed rejection is overcome.

If Appellants elect prosecution before the Examiner and this does not result in allowance of the application, abandonment or a second appeal, this case should be returned to the Board of Patent Appeals and Interferences for final action on the affirmed rejection, including any timely request for rehearing thereof.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv) (2007).

AFFIRMED-IN-PART; 37 C.F.R. § 41.50(b)

vsh

WELSH & KATZ
120 S RIVERSIDE PLAZA
22ND FLOOR
CHICAGO IL 60606

APPENDIX

STATISTICAL AVERAGES

A Methodological Study

BY

DR. FRANZ ŽIŽEK
Privat-Docent in Statistics in the University of Vienna

AUTHORIZED TRANSLATION
WITH ADDITIONAL NOTES AND REFERENCES
BY

WARREN MILTON PERSONS
Professor of Economics in Colorado College

NEW YORK
HENRY HOLT AND COMPANY
1913

CONTENTS

CONTENTS ix

dividual observations. Such observations arise ordinarily through measurement. Thus, for example, the age, wages, income, length of life, etc., of single individuals in definite groups of the population are measured and are then represented in the form of series. Cases occur, however, in which the items contained in the series do not deal with real measurements but with quantitative observations of another kind, such as are obtained by counting. Thus, for instance, houses are observed with reference to the number of their occupants, families with reference to the number of children.[6]

From series of quantitative observations various kinds of averages may be computed, of which the most important are the arithmetic mean, the median (that is, the middle number of the series when the items are arranged accord-

[6] Series of quantitative individual observations, whether they be actual measurements or quantitative individual observations of another kind, are either space, time, qualitative, or quantitative series. The units to which the observations refer frequently belong to different space or time divisions; thus, for example, the domiciles of persons whose age, income, etc., are measured present space differences, and the data giving ages at marriage or death present time differences. But the space or time differentiation of the individual observations, which appears in the original material, normally disappears during the course of the statistical work and is not evident in the resulting statistical series. Series of quantitative individual observations are, furthermore, not qualitative series, since similar units are selected for measurement. Neither are series of quantitative individual observations identical with the group of quantitative series—as many authors appear to assume—because only those series are to be designated as "quantitative" whose items are differentiated from one another by some quantitative criterion, as, for example, is the case with series of death rates, birth rates, etc., for different age classes of the population. The fact that quantitative individual observations possess different numerical values for the element of observation does not constitute them quantitative series, since all series (time, space, etc.) consist of numbers of various sizes. The above-mentioned customary division of statistical series into space, time, qualitative, and quantitative groups is, therefore, not exhaustive.

ing to size, or, in case there is an even number of items, the arithmetic mean of the two middle numbers), and the mode (that is, the relatively most frequent value, the point of greatest density). The average computed from the series represents the mean of the measurement in question (average age, average wage, average income, mean and probable lifetime); or else it indicates, when a definite quantitative character is obtained by counting, how many units of that character occur on the average (for instance, the average number of occupants per house, or children per family).

Quantitative observations are not always presented with the greatest possible detail. Often the variant items are tabulated according to class (for example, age, income, wage classes, etc.). The frequency table, thus obtained, merely indicates (absolutely or relatively) how many items belong to the different classes. Averages may be computed from the frequency tables for the character in question, either measured or counted, no matter whether the tables consist of absolute or relative numbers.

The items which produce the series in question may belong to the most varied branches of social life. Moreover, similar series may arise from observations in natural science. Especially meteorological (thermal and barometric) observations, and also anthropological measurements (height, chest-girth, various dimensions of the skull, muscular power, lung capacity, etc.), produce series which are well adapted to the application of statistical methods. Likewise, series of measurements of certain characters of animals and plants have recently been investigated according to the methods of scientific statistics. Indeed, the most important methods of modern mathematical statistics have been developed from biological material, and statistical method plays as important a part in modern biology as it does in sociology. In particular, the questions of variation and heredity are being investigated with great success

CHAPTER III

THE GEOMETRIC MEAN

The geometric (or logarithmic) mean of n items is the nth root of their product. Where the items are represented by $a_1, a_2 \ldots a_n$ the formula for the geometric mean is $\sqrt[n]{a_1 a_2 \cdots a_n}$.[65] The great amount of arithmetic work involved in computing the geometric mean directly is lessened by the use of logarithms. The natural number corresponding to the arithmetic mean of the logarithms of a number of items is the geometric mean of those items.

The geometric mean has this property in common with the arithmetic mean, that in its computation the sizes of all the items are of decided influence on the size of the mean.[66] A change of a single item must affect the numerical size of the mean. This does not hold for the median or the mode. These means may remain unchanged even if considerable parts of the series are changed. The geometric mean has also this property in common with the arithmetic mean, that it may not coincide with any of the items used in computing it. As a rule the geometric mean is a value which does not occur in the series of items. If items of approximately the same size do not occur at all or only

[65] Therefore, by raising the geometric mean to the same power as there are items, the product of all these items is found, just as by multiplying the arithmetic mean with the number of items the sum of the latter is obtained.

[66] A series, in which an item equals zero, always gives zero for the geometric mean, without regard to the size of the other values of the series, since the multiplication of any number by zero gives the product zero.

rarely, we may call the geometric mean a mere arithmetic abstraction and we must consider it as an " atypical " mean.

The computation of the geometric mean like the computation of the simple arithmetic mean presupposes that the items have equal weights. If, in a concrete case, we think that this supposition does not correspond to fact, then we may treat this case by a method similar to that used in the computation of a weighted arithmetic mean from a series of items of unequal weights. Before computing the geometric mean we might modify the series by raising every item to the power which indicates its importance or weight and then find the nth root of the product of the rectified items, where n equals the sum total of the weights. In this way we might obtain, so to speak, a weighted geometric mean of the series.

The geometric mean plays a very subordinate rôle in practical statistics. It has been used by statisticians only sporadically, for instance, by Jevons in his monograph " A Serious Fall in the Value of Gold " (1863) for the computation of the mean index number from the single indices indicating the price fluctuation of various commodities.[85]

The geometric mean is never greater than the arithmetic mean of a series of items.[85a] The difference, however, is usu-

[85] See also the article "On the Variation of Prices," etc., by Jevons in the Journ. of the Roy. Stat. Soc. (1865), p. 294 ff. Jevons has not expressed the different importance of the different commodities, i.e., he has computed a simple, not a weighted, geometric mean.

[85a] To prove

$$\sqrt[n]{a_1 \cdot a_2 \cdot \ldots \cdot a_n} \leqq \frac{a_1 + a_2 + \ldots + a_n}{n}$$

The theorem follows by mathematical induction as follows (changing the notation):

(1) If a given quantity, a, be divided into three parts, x, y, z, the maximum value of the product xyz is attained when the

ally not very large, especially if the means are based on a great number of items. Thus, the geometric means of the 39 index numbers quoted by Jevons for the years 1851, 1853, 1855, 1857, and 1859 amount to 92.4, 111.3, 117.6, 128.8, and 116; the arithmetic means computed from the same index numbers for the same years are 94.6, 112.4, 119, 134, and 119.[20-27]

parts are equal, or when $x = y = z = \frac{s}{3}$. This theorem is easily proven by the method of the differential calculus.

(2) *Assume* that the maximum value of the continued product $x\,y\,z\,\ldots\ldots\ldots$ (to n—1 factors), where their sum is a constant, is attained when the factors are equal.

(3) Consider the product

$$w \cdot x \cdot y \cdot z\,\ldots\ldots\ldots\ldots\ldots \text{ (n factors)} = p$$

where $w + x + y + z + \ldots\ldots\ldots\ldots\ldots = s$

If any value, b, be assigned to w, then the maximum value of the product, p, is attained when the second composite factor is a maximum, or according to (2), when the n—1 factors are each equal to $\frac{s-b}{n-1}$. Consider, therefore, the function $w \cdot x^{n-1}$ and allow w to take values varying from o to a. For what value of w is this function a maximum?

$$p = w \cdot x^{n-1} = w \cdot \left(\frac{s-w}{n-1}\right)^{n-1}$$

for a maximum

$$\frac{dp}{dw} = \left(\frac{s-w}{n-1}\right)^{n-2} \cdot \left(\frac{s-nw}{n-1}\right) = o$$

$$w = \frac{s}{n}$$

or, the maximum value of the product $w \cdot x \cdot y \cdot z\,\ldots\ldots\ldots\ldots$ is attained when $w = x = y = \ldots\ldots\ldots\ldots = \frac{s}{n}$.

(4) But, since the maximum value of the product of three factors is attained when $x = y = z$, then, by (3), the maximum value of the product of four factors is attained when they are equal, and so on indefinitely to n factors.—TRANSLATOR.

[26] F. Y. Edgeworth, "A Defense of Index-Numbers," The Econ. Journ., Vol. VI (1896), p. 137.

[27] If we compute the arithmetic, the harmonic, and the geometric means of a set of items, then the last is at the same time the geometric mean between the first two means. The values 1 and 2,

Comparisons between the geometric and arithmetic means computed from the same series prove that the former is not influenced by extreme items to the same degree as the latter. The geometric mean of commodity index numbers is, therefore, less influenced by violent price fluctuations of single commodities than is the arithmetic mean. This property of the geometric mean is an advantage in such problems as in the representation of the movements of the price level where we do not think it justified for an exceptionally strong change in the price of a single commodity to influence the result to such a degree as is the case if the arithmetic mean is applied. Bowley recommends controlling the arithmetic mean by simultaneously computing the geometric mean of the items in question. If the arithmetic and geometric means of a series differ considerably from each other, the geometric mean must be considered to be more correct on account of the advantage mentioned above.[88]

The use of the geometric mean in computing mean index numbers has, as has been explained by Westergaard, the special advantage that the same result is obtained for a given period, no matter if this period is taken as a whole or divided into shorter epochs, which afterwards are combined. If the changes of the price level from 1860 to 1870 and from 1870 to 1880 have been computed by use of the geometric mean, then by combining these changes the same result is obtained for the price fluctuation from 1860 to 1880, as though the whole period had been treated

for instance, give the arithmetic mean 1.50, the harmonic mean 1.33, and the geometric mean 1.41. The last value is at the same time the geometric mean between 1.33 and 1.50. From this relation of the three means it follows that if two of them are given, the third may be computed directly from them (cf. Messedaglia, "Calcul des valeurs moyennes," Annales de démographie internationale (1880), p. 390).

[88] Elements of Statistics, 2nd ed., p. 128 f.

at once. This is not the case if the arithmetic mean is used.[88-88a]

[88] Cf. Westergaard, Die Grundzüge, p. 218 ff.; see also Bowley, Elements of Statistics, 2nd ed., p. 223.

[88a] Prof. A. W. Flux has tested the effect of a change of the base year with reference to which the commodity index numbers are calculated. The simple or weighted arithmetic mean of the commodity indices was found to vary by as much as 6% on account of the change. Of course a change of the base year does not affect the geometric mean ("Modes of Constructing Index-Numbers," Quar. Journ. Econs., Vol. XXI, p. 613.)—TRANSLATOR.